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ABSTRACT

A report to provide information which can improve the ability of a district to evaluate its performance is presented. The report is also intended as an interpretive document for those school districts receiving individualized performance profiles. Information is presented on scales which show the percentile rank of a particular district relative to other districts in the State. An extensive period of developing systems and procedures for analyzing and presenting evaluative data is covered. The report is divided into two sections: (1) Measuring the Performance of school Districts and (2) Supplementary Information. A bibliography is included. (Author/CK)

NEW YORK STATE

# PERFORMANCE INDICATORS IN EDUCATION

1972 Report

The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Bureau of School Programs Evaluation
Albany, New York 12224
September 1972

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## FOREWORD

It is the purpose of this report to provide information which can impro district to evaluate its performance. The report is intended not only to desc indicators program but is also an interpretive document for those school distri individualized performance profiles.

Information in this report is presented on scales which show the percent ular district relative to other districts in the State. Information about the a district along certain criterion dimensions are also included. These expecto on an analysis of information about socioeconomic and other factors prevailing served by the district.

This report follows an extensive period of developing systems and proced and presenting evaluative data. The Quality Measurement Project, started in 19 for the Performance Indicators in Education program in New York State as well a the current activity in other states. Development of the procedures reported i in 1967 when the Education Department contracted to study the feasibility of in performance indicators for evaluating and improving the schools of the State. in a report and recommendation that planning be started for an evaluation syste together the various mechanisms for collecting, analyzing, and disseminating edu information (Dyer, 1968). Aided by an ESEA Title V grant, the planning and ana

## FOREWORD

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s performance. The report is intended not only to describe the performance
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to other districts in the State. Information about the expected rankings of
n criterion dimensions are also included. These expected rankings are based
mation about socioeconomic and other factors prevailing in the community

ows an extensive period of developing systems and procedures for analyzing
ve data. The Quality Measurement Project, started in 1957, laid the foundation
licators in Education program in New York State as well as stimulating much of
other states. Development of the procedures reported in this document began
ion Department contracted to study the feasibility of instituting a system of
for evaluating and improving the schools of the State. The study culminated
ndation that planning be started for an evaluation system which would tie
echanisms for collecting, analyzing, and disseminating educational data and
3). Aided by an ESEA Title V grant, the planning and analysis component of the

proposed evaluation system was initiated as the Performance Indicators i
In 1969, work commenced on developing a methodology and a set of mathema
performance data (Anderson, 1969). While the first models were not prec
this work provided a foundation for additional development. In late 196
grams was developed to facilitate the building and testing of better mod
equations were developed by the PIE staff and the first performance repo
troduced to local school administrators in May 1971. Refinements of th
mat are incorporated in the present report.

The following individuals helped to make this report possible: Mar
Heim, David J. Irvine, William C. Link, Jr., and Gerald H. Wohlferd. Va
provided by Ruth E. Callaghan, James A. Carter, Joseph A. Forte, Jack A.
Lee R. Wolfe, and members of their staffs. Management of the project wa
with the assistance of Philip J. Pillsworth.

The first section of this report describes the reports developed fo
a background for understanding the information they contain. The second
tal information, such as definitions of variables and forms of the equat
papers related to the PIE program is also included.

Lorne H. Wo
Associate C
and Evalu

was initiated as the Performance Indicators in Education (PIE) program.
developing a methodology and a set of mathematical models for generating
, 1969). While the first models were not precise enough to implement,
ation for additional development. In late 1969, a system of computer pro-
ilitate the building and testing of better models (Baisuck, 1969). New
y the PIE staff and the first performance reports were generated and in-
lministrators in May 1971. Refinements of the equations and report for-
e present report.

uals helped to make this report possible: Margaret L. Barber, John J.
iam C. Link, Jr., and Gerald H. Wohlferd. Valuable assistance was also
han, James A. Carter, Joseph A. Forte, Jack A. Maybee, John J. Stiglmeier,
of their staffs. Management of the project was provided by Alan D. Stewart,
lip J. Pillsworth.

this report describes the reports developed for each district and provides
ding the information they contain. The second section contains supplemen-
efinitions of variables and forms of the equations. A bibliography of
program is also included.

Lorne H. Woollatt

Lorne H. Woollatt
Associate Commissioner for Research
and Evaluation

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## MEASURING THE PERFORMANCE OF SCHOOL DISTRICTS

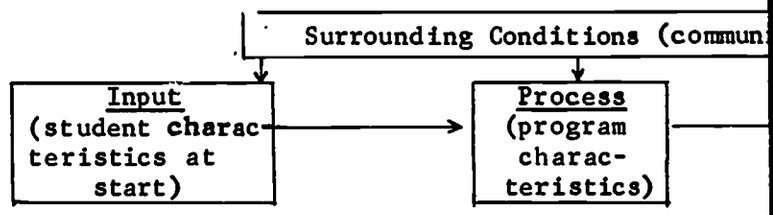
- Defining Performance
- Computational Procedures
- Applying the Procedures
- Reading and Interpreting the Tables
- Using the PIE System
- Implications for Education

MEASURING THE PERFORMANCE OF SC

Information about the performance of a school system managed efficiently. To provide this kind of information f the State Education Department has begun producing performa Indicators in Education (PIE) program.

Defining Performance

Factors contributing to the output of a school distr




This diagram "says" in effect that measurements made achievement test scores of students completing a course of inputs, conditions outside the school, and conditions inside intention was to estimate the difference between (a) the le could be expected if the school's contribution to output we level of the school's output. The difference between the t the school's performance. A high-performing school, by th creased the achievement of its students beyond the level th

MEASURING THE PERFORMANCE OF SCHOOL DISTRICTS

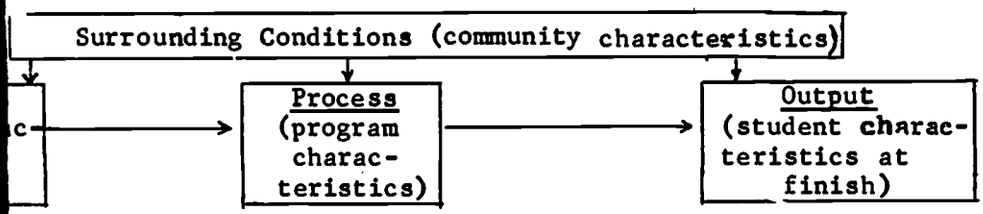
the performance of a school system is essential if the system is to be

provide this kind of information for the public schools of New York State,

tment has begun producing performance information through its Performance

(PIE) program.

ng to the output of a school district are represented below.




" in effect that measurements made at the output side of the school, e.g.,

f students completing a course of study, are a function of three things:

e the school,and conditions inside the school. In the PIE program,the

the difference between (a) the level of output which

school's contribution to output were not significant and (b) the actual

put. The difference between the two values was taken as an indicator of

A high-performing school, by this definition, would be one which in-

f its students beyond the level that would be expected after accounting

for initial pupil achievement and external factors such as social and e
community.

Computational Procedures

The task of obtaining an actual output measure for each distric
data were already available in the Education Department. However, the
ted output score for each district was more complicated. To obtain thi
develop an equation which represented in quantitative terms the relatio
condition variables on the one hand and the output variable on the othe
op such equations is known as regression analysis and is described on
further information. Note that in developing such an equation the vari
ditions inside the school were excluded as predictors. By excluding th
one could be reasonably sure that some of the difference found between
put scores was attributable to variables left out of the equation, i.e.

However, part of the difference between the actual and expected s
be attributed to missing input or surrounding condition variables, to a
of variables were incorrectly stated, and to error of measurement. The
discrepancy are dealt with by constantly seeking better data and more p

nd external factors such as social and economic conditions in the

actual output measure for each district was no problem since the
he Education Department. However, the task of obtaining the expec-
ct was more complicated. To obtain this score,it was necessary to
ented in quantitative terms the relationships between the input and
and and the output variable on the other. The method used to devel-
egression analysis and is described on page 23 for those wishing
in developing such an equation the variables having to do with con-
xcluded as predictors. By excluding these intraschool variables,
t some of the difference found between the actual and expected out-
ariables left out of the equation, i.e., to intraschool conditions.
rence between the actual and expected scores for a district could also
r surrounding condition variables, to an equation in which the relations
ted, and to error of measurement. The first two of these sources of
nstantly seeking better data and more precise analyses of data.

To deal with the problem of error of measurement, confidenc
each expected score. If an actual score fell outside of these st
there was a two-thirds probability that the difference between th
was not due to chance. If a district's actual score was sufficie
confidence limits around the expected score, the district was reg
expected with the students it had and the conditions under which i
whose actual score fell within the confidence limits was regarded

One of the significant features of this method of calculatin
not require that districts be compared directly with each other.
compared to its own unique standard which was derived from its own

The data used to compute performance were drawn from the Dep
Three broad categories of data were defined: 1) pupil data, which
on standardized achievement tests administered annually in all pub
grades 1, 3, and 6; 2) measures of school factors, including such
expenditures; 3) measures of nonschool conditions, such as proper
density in the district.

n of error of measurement, confidence limits were computed for
tual score fell outside of these statistically-determined limits,
lity that the difference between the actual and expected scores
istrict's actual score was sufficiently high to fall outside the
xpected score, the district was regarded as doing better than
had and the conditions under which it was operating. A district
the confidence limits was regarded as doing an average job.
eatures of this method of calculating performance is that it does
compared directly with each other. Instead, each district is
ndard which was derived from its own unique characteristics.
performance were drawn from the Department's regular data files.
were defined: 1) pupil data, which consist of scores obtained
sts administered annually in all public schools to students in
es of school factors, including such variables as instructional
nonschool conditions, such as property value and population

## Applying the Procedures

Using the procedure just described, equations were developed to compu scores for each district (See page 21). Four scores reflected district perf four scores for grade 6. Four other scores reflected the gain in achievement and grades 3 to 6. About 628 school districts were included; the five larges New York State were omitted because of their unique characteristics, as were there were incomplete data.

After the equations were developed, performance scores were generated inserting data from the district into the appropriate equation, working the expected score, and computing the difference between the expected score and score on that measure. The results are reported to the district in tables s pages 7 through 11 of this report.

## Reading and Interpreting the Tables

Several items of information can be derived from the tables. First, t district on any variable shown in the tables is noted by an arrow. Second, the score for the district and the scores on the same variable for other dis may be found by looking across to the percentile scale in the column on the examination of the profiles for Scottsville shows that in the first column ( 1966) the district ranked near the 75th percentile relative to all 628 distr

escribed, equations were developed to compute 12 expected output
e 21). Four scores reflected district performance for grade 3;
ner scores reflected the gain in achievement from grades 1 to 3
ool districts were included; the five largest cities in
se of their unique characteristics, as were districts for which

veloped, performance scores were generated for each district by
into the appropriate equation, working the equation to find the
difference between the expected score and the district's actual
ts are reported to the district in tables similar to those on

es

n can be derived from the tables. First, the actual score for the
the tables is noted by an arrow. Second, the relationship between
e scores on the same variable for other districts in the State
the percentile scale in the column on the extreme left. An
cottsville shows that in the first column (first grade readiness,
e 75th percentile relative to all 628 districts in the study.

In other words, only about 25 percent of the districts obtai
higher than Scottsville's. One can also observe that Scotts
(standard deviations) was average in 1966 and less than aver

Reading scores for the third grade (columns 7, 8, 9)
but declined steadily over the period from 1968 to 1970. In
grade reading scores were computed (1969 and 1970), there wer
and the expected scores for Scottsville. The standard devia
in the district (columns 10, 11, 12) increased from about th
87th percentile in 1970. This fact indicates that over this
geneity in student performance in reading has increased mark

Columns 14 and 15 show that Scottsville's actual scor
average but within the range expected for a district with Sc

A look at the sixth grade reading data shows that the
average and there is no significant difference between the a
Scottsville's ranking on sixth grade arithmetic is only abou
ing between reading and arithmetic at the sixth grade level?
but possibly Scottsville's students come from above average
for example, that performance in reading is typically more a

percent of the districts obtained a mean first grade readiness score
ne can also observe that Scottsville's range of readiness scores
rage in 1966 and less than average in 1967 and 1968.
third grade (columns 7, 8, 9) were high relative to all districts
e period from 1968 to 1970. In the years for which expected third
puted (1969 and 1970), there were no real differences between the actual
cottsville. The standard deviation of third grade reading scores with-
1, 12) increased from about the 52d percentile in 1968 to about the
fact indicates that over this period of time the degree of hetero-
in reading has increased markedly.
that Scottsville's actual scores on third grade arithmetic were above
xpected for a district with Scottsville's characteristics.
de reading data shows that the actual means are well above the State
ficant difference between the actual and expected means. However,
grade arithmetic is only about average. Why the difference in rank-
etic at the sixth grade level? The data do not answer this question
dents come from above average socioeconomic backgrounds. It is known,
in reading is typically more a function of socioeconomic factors

## PROFILE OF SCHOOL DISTRICT CHARACTERISTICS 1a

**District:** Scottsville **Code:** 701301

| Percentile Rank[1] | Readiness Scores[2] of First Grade Pupils | | | | | | |
|---|---|---|---|---|---|---|---|
| | DISTRICT MEANS | | | STANDARD DEVIATIONS | | | |
| | 1966 | 1967 | 1968 | 1966 | 1967 | 1968 | 1968 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Above 95 | 72.49 | 73.16 | 73.55 | 17.74 | 17.86 | 17.72 | 39.14 |
| 90 | 70.76 | 71.60 | 72.21 | 17.09 | 16.88 | 16.51 | 37.93 |
| 85 | 69.79 | 70.77 | 71.11 | 16.49 | 16.27 | 16.13 | 37.11 |
| 80 | 68.48 | 69.72 | 70.15 | 16.10 | 15.93 | 15.61 | 36.61 |
| 75 | 67.50 | 68.82 | 69.26 | 15.70 | 15.57 | 15.24 | 36.17 |
| 70 | 66.68 | 68.02 | 68.67 | 15.41 | 15.30 | 14.99 | 35.59 |
| 65 | 66.20 | 67.20 | 68.09 | 15.17 | 14.92 | 14.72 | 35.16 |
| 60 | 65.83 | 66.59 | 67.50 | 14.95 | 14.67 | 14.47 | 34.82 |
| 55 | 65.38 | 66.05 | 66.90 | 14.68 | 14.46 | 14.14 | 34.51 |
| 50 | 64.76 | 65.49 | 66.33 | 14.48 | 14.19 | 13.88 | 34.09 |
| 45 | 64.28 | 64.95 | 65.94 | 14.24 | 14.00 | 13.64 | 33.82 |
| 40 | 63.45 | 64.38 | 65.29 | 14.03 | 13.71 | 13.41 | 33.44 |
| 35 | 62.90 | 63.74 | 64.69 | 13.75 | 13.47 | 13.21 | 33.01 |
| 30 | 62.09 | 63.19 | 63.98 | 13.44 | 13.22 | 13.01 | 32.58 |
| 25 | 61.26 | 62.56 | 63.33 | 13.11 | 12.94 | 12.78 | 32.04 |
| 20 | 60.42 | 61.65 | 62.46 | 12.80 | 12.62 | 12.42 | 31.52 |
| 15 | 59.50 | 60.49 | 61.68 | 12.47 | 12.19 | 12.22 | 31.00 |
| 10 | 58.12 | 59.36 | 60.53 | 12.11 | 11.64 | 11.67 | 30.01 |
| 5 | 56.72 | 56.83 | 58.42 | 11.32 | 10.72 | 10.76 | 29.21 |
| Below | | | | | | | |
| State Mean | 64.55 | 65.49 | 66.32 | 14.50 | 14.28 | 14.18 | 34.20 |
| State s.d. | 4.97 | 4.79 | 4.83 | 2.04 | 2.23 | 3.97 | 4.05 |

PERCENTILE DISTRIBUTION

[1] Population of districts excludes the six largest cities and districts with incomplete data.

[2] Readiness and achievement scores were based on statewide PEP tests normally administered in October.

4 Definitions

## PROFILE OF SCHOOL DISTRICT CHARACTERISTICS[1a]

**District:** Scottsville **Code:** 701301

| diness Scores[2] of First Grade Pupils | | | | Third Grade Reading[2] | | |
|---|---|---|---|---|---|---|
| | STANDARD DEVIATIONS | | | DISTRICT MEANS | | |
| 1968 | 1966 | 1967 | 1968 | 1968 | 1969 | 1970 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 73.55 | 17.74 | 17.86 | 17.72 | 39.14 | 39.37 | 38.45 |
| 72.21 | 17.09 | 16.88 | 16.51 | 37.93 | 37.82 | 37.30 |
| 71.11 | 16.49 | 16.27 | 16.13 | 37.11 | 37.14 | 36.77 |
| 70.15 | 16.10 | 15.93 | 15.61 | 36.61 | 36.39 | 36.25 |
| 69.26 | 15.70 | 15.57 | 15.24 | 36.17 | 36.04 | 35.79 |
| 68.67 | 15.41 | 15.30 | 14.99 | 35.59 | 35.63 | 35.33 |
| 68.09 | 15.17 | 14.92 | 14.72 | 35.16 | 35.12 | 34.94 |
| 67.50 | 14.95 | 14.67 | 14.47 | 34.82 | 34.77 | 34.52 |
| 66.90 | 14.68 | 14.46 | 14.14 | 34.51 | 34.41 | 34.23 |
| 66.33 | 14.48 | 14.19 | 13.88 | 34.09 | 34.02 | 33.84 |
| 65.94 | 14.24 | 14.00 | 13.64 | 33.82 | 33.62 | 33.43 |
| 65.29 | 14.03 | 13.71 | 13.41 | 33.44 | 33.33 | 33.12 |
| 64.69 | 13.75 | 13.47 | 13.21 | 33.01 | 32.86 | 32.60 |
| 63.98 | 13.44 | 13.22 | 13.01 | 32.58 | 32.54 | 32.09 |
| 63.33 | 13.11 | 12.94 | 12.78 | 32.04 | 31.93 | 31.47 |
| 62.46 | 12.80 | 12.62 | 12.42 | 31.52 | 31.48 | 31.12 |
| 61.68 | 12.47 | 12.19 | 12.22 | 31.00 | 30.76 | 30.56 |
| 60.53 | 12.11 | 11.64 | 11.67 | 30.01 | 30.03 | 29.94 |
| 58.42 | 11.32 | 10.72 | 10.76 | 29.21 | 28.83 | 28.23 |
| 66.32 | 14.50 | 14.28 | 14.18 | 34.20 | 34.01 | 33.73 |
| 4.83 | 2.04 | 2.23 | 3.97 | 4.05 | 3.16 | 3.08 |

gest cities and districts with incomplete data.
ed on statewide PEP tests normally administered in October.

[1a] Definitions pp. 16-17.

**PROFILE OF SCHOOL DISTRICT CHARACTERIST**

**District:** Scottsville **Code:** 70130

| Percentile Rank | Third Grade Reading (cont.) | | | Third Grad | | |
|---|---|---|---|---|---|---|
| | STANDARD DEVIATIONS | | | DISTRICT MEANS | | |
| | 1968 | 1969 | 1970 | 1968 | 1969 | 1970 |
| | 10 | 11 | 12 | 13 | 14 | 15 |
| Above 95 | 12.48 | 12.53 | 12.65 | 39.66 | 39.56 | 39.05 |
| 90 | 12.09 | 12.10 | 12.27 | 38.88 | 38.36 | 37.71 |
| 85 | 11.79 | 11.83 | 11.89 | 38.15 | 37.35 | 36.79 |
| 80 | 11.61 | 11.60 | 11.66 | 37.60 | 36.63 | 36.13 |
| 75 | 11.41 | 11.43 | 11.47 | 37.20 | 36.13 | 35.46 |
| 70 | 11.25 | 11.29 | 11.31 | 36.79 | 35.52 | 34.83 |
| 65 | 11.12 | 11.15 | 11.20 | 36.42 | 34.96 | 34.40 |
| 60 | 11.02 | 11.03 | 11.09 | 36.12 | 34.50 | 33.98 |
| 55 | 10.90 | 10.92 | 10.97 | 35.71 | 34.00 | 33.53 |
| 50 | 10.76 | 10.79 | 10.84 | 35.42 | 33.58 | 32.96 |
| 45 | 10.63 | 10.67 | 10.73 | 35.14 | 33.20 | 32.50 |
| 40 | 10.51 | 10.55 | 10.62 | 34.73 | 32.77 | 32.08 |
| 35 | 10.35 | 10.42 | 10.46 | 34.38 | 32.25 | 31.62 |
| 30 | 10.18 | 10.28 | 10.31 | 33.92 | 31.64 | 31.11 |
| 25 | 9.93 | 10.09 | 10.16 | 33.42 | 31.14 | 30.68 |
| 20 | 9.75 | 9.92 | 9.96 | 32.95 | 30.75 | 30.02 |
| 15 | 9.57 | 9.73 | 9.80 | 32.29 | 30.06 | 29.22 |
| 10 | 9.27 | 9.44 | 9.49 | 31.52 | 29.35 | 28.29 |
| 5 | 8.80 | 8.77 | 9.01 | 30.30 | 27.46 | 26.55 |
| Below | | | | | | |
| State Mean | 10.83 | 10.75 | 10.82 | 35.38 | 33.63 | 33.04 |
| s.d. | 3.77 | 1.12 | 1.08 | 3.88 | 3.63 | 3.72 |

PERCENTILE DISTRIBUTION

-8-

**PROFILE OF SCHOOL DISTRICT CHARACTERISTICS**

**District:** Scottsville **Code:** 701301

| (cont.) | Third Grade Arithmetic | | | | | |
|---|---|---|---|---|---|---|
| ONS | DISTRICT MEANS | | | STANDARD DEVIATIONS | | |
| 1970 | 1968 | 1969 | 1970 | 1968 | 1969 | 1970 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 12.65 | 39.66 | 39.56 | 39.05 | 10.96 | 13.38 | 13.54 |
| 12.27 | 38.88 | 38.36 | 37.71 | 10.57 | 13.02 | 13.00 |
| 11.89 | 38.15 | 37.35 | 36.79 | 10.30 | 12.58 | 12.66 |
| 11.66 | 37.60 | 36.63 | 36.13 | 10.07 | 12.36 | 12.48 |
| 11.47 | 37.20 | 36.13 | 35.46 | 9.88 | 12.11 | 12.32 |
| 11.31 | 36.79 | 35.52 | 34.83 | 9.71 | 11.96 | 12.16 |
| 11.20 | 36.42 | 34.96 | 34.40 | 9.60 | 11.84 | 12.04 |
| 11.09 | 36.12 | 34.50 | 33.98 | 9.46 | 11.72 | 11.93 |
| 10.97 | 35.71 | 34.00 | 33.53 | 9.34 | 11.63 | 11.83 |
| 10.84 | 35.42 | 33.58 | 32.96 | 9.20 | 11.53 | 11.68 |
| 10.73 | 35.14 | 33.20 | 32.50 | 9.05 | 11.39 | 11.55 |
| 10.62 | 34.73 | 32.77 | 32.08 | 8.91 | 11.24 | 11.41 |
| 10.46 | 34.38 | 32.25 | 31.62 | 8.78 | 11.10 | 11.27 |
| 10.31 | 33.92 | 31.64 | 31.11 | 8.62 | 10.93 | 11.13 |
| 10.16 | 33.42 | 31.14 | 30.68 | 8.51 | 10.75 | 10.99 |
| 9.96 | 32.95 | 30.75 | 30.02 | 8.35 | 10.58 | 10.86 |
| 9.80 | 32.29 | 30.06 | 29.22 | 8.18 | 10.43 | 10.57 |
| 9.49 | 31.52 | 29.35 | 28.29 | 8.00 | 10.14 | 10.25 |
| 9.01 | 30.30 | 27.46 | 26.55 | 7.51 | 9.66 | 9.74 |
| 10.82 | 35.38 | 33.63 | 33.04 | 9.34 | 11.49 | 11.65 |
| 1.08 | 3.88 | 3.63 | 3.72 | 3.78 | 1.20 | 1.09 |

## PROFILE OF SCHOOL DISTRICT CHARACTERISTICS

**District:** Scottsville **Code:** 701301

| Percentile Rank | Sixth Grade Reading | | | | | | |
|---|---|---|---|---|---|---|---|
| | DISTRICT MEANS | | | STANDARD DEVIATIONS | | | |
| | 1968 | 1969 | 1970 | 1968 | 1969 | 1970 | 196 |
| | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Above 95 | 48.71 | 48.09 | 47.74 | 14.23 | 14.14 | 14.38 | 39.64 |
| 90 | 47.50 | 46.95 | 46.35 | 13.85 | 13.83 | 13.84 | 38.38 |
| 85 | 46.75 | 46.17 | 45.51 | 13.49 | 13.48 | 13.57 | 37.45 |
| 80 | 46.12 | 45.53 | 45.01 | 13.29 | 13.26 | 13.38 | 36.59 |
| 75 | 45.55 | 45.05 | 44.51 | 13.07 | 13.11 | 13.21 | 35.98 |
| 70 | 45.00 | 44.60 | 43.99 | 12.86 | 12.94 | 13.03 | 35.42 |
| 65 | 44.56 | 44.12 | 43.70 | 12.72 | 12.76 | 12.92 | 34.94 |
| 60 | 44.19 | 43.65 | 43.33 | 12.59 | 12.64 | 12.76 | 34.52 |
| 55 | 43.78 | 43.33 | 42.81 | 12.45 | 12.50 | 12.59 | 33.86 |
| 50 | 43.37 | 42.92 | 42.40 | 12.34 | 12.33 | 12.48 | 33.50 |
| 45 | 43.00 | 42.59 | 42.00 | 12.17 | 12.21 | 12.36 | 33.13 |
| 40 | 42.63 | 42.19 | 41.53 | 12.05 | 12.02 | 12.22 | 32.59 |
| 35 | 42.27 | 41.65 | 41.08 | 11.87 | 11.88 | 12.05 | 32.10 |
| 30 | 41.62 | 41.15 | 40.70 | 11.65 | 11.68 | 11.86 | 31.54 |
| 25 | 41.31 | 40.62 | 40.29 | 11.49 | 11.51 | 11.66 | 31.06 |
| 20 | 40.85 | 40.14 | 39.70 | 11.25 | 11.34 | 11.46 | 30.54 |
| 15 | 40.07 | 39.24 | 38.95 | 11.00 | 11.06 | 11.20 | 29.79 |
| 10 | 39.13 | 38.61 | 38.18 | 10.66 | 10.69 | 10.90 | 28.92 |
| 5 | 38.14 | 36.90 | 36.86 | 10.19 | 10.20 | 10.40 | 27.32 |
| Below | | | | | | | |
| State Mean | 43.38 | 42.81 | 42.34 | 12.25 | 12.28 | 12.42 | 33.59 |
| s.d. | 3.23 | 3.37 | 3.25 | 1.25 | 1.23 | 1.22 | 3.75 |

PERCENTILE DISTRIBUTION

## ROFILE OF SCHOOL DISTRICT CHARACTERISTICS

District: Scottsville Code: 701301

| Sixth Grade Reading | | | | Sixth Grade Arithmetic | | |
|---|---|---|---|---|---|---|
| | STANDARD DEVIATIONS | | | DISTRICT MEANS | | |
| o | 1968 | 1969 | 1970 | 1968 | 1969 | 1970 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 74 | 14.23 | 14.14 | 14.38 | 39.64 | 40.24 | 39.19 |
| 35 | 13.85 | 13.83 | 13.84 | 38.38 | 38.41 | 37.64 |
| 51 | 13.49 | 13.48 | 13.57 | 37.45 | 37.47 | 36.77 |
| 01 | 13.29 | 13.26 | 13.38 | 36.59 | 36.84 | 36.18 |
| 51 | 13.07 | 13.11 | 13.21 | 35.98 | 36.37 | 35.59 |
| 99 | 12.86 | 12.94 | 13.03 | 35.42 | 35.98 | 35.06 |
| 70 | 12.72 | 12.76 | 12.92 | 34.94 | 35.36 | 34.55 |
| 33 | 12.59 | 12.64 | 12.76 | 34.52 | 34.94 | 34.16 |
| 31 | 12.45 | 12.50 | 12.59 | 33.86 | 34.53 | 33.63 |
| 40 | 12.34 | 12.33 | 12.48 | 33.50 | 34.17 | 33.27 |
| 00 | 12.17 | 12.21 | 12.36 | 33.13 | 33.79 | 32.93 |
| 53 | 12.05 | 12.02 | 12.22 | 32.59 | 33.31 | 32.52 |
| 08 | 11.87 | 11.88 | 12.05 | 32.10 | 32.79 | 31.95 |
| 70 | 11.65 | 11.68 | 11.86 | 31.54 | 32.17 | 31.58 |
| 29 | 11.49 | 11.51 | 11.66 | 31.06 | 31.62 | 31.19 |
| 70 | 11.25 | 11.34 | 11.46 | 30.54 | 31.12 | 30.49 |
| 95 | 11.00 | 11.06 | 11.20 | 29.79 | 30.50 | 30.04 |
| 18 | 10.66 | 10.69 | 10.90 | 28.92 | 29.61 | 29.30 |
| 86 | 10.19 | 10.20 | 10.40 | 27.32 | 28.41 | 28.05 |
| 34 | 12.25 | 12.28 | 12.42 | 33.59 | 34.12 | 33.39 |
| 25 | 1.25 | 1.23 | 1.22 | 3.75 | 3.51 | 3.39 |

**PROFILE OF SCHOOL DISTRICT CHA**

**District:** Scottsville **Coo**

| Percentile Rank | Sixth Grade Arithmetic (cont.) STANDARD DEVIATIONS 1968 | 1969 | 1970 | Achievement G 1968 (Gr. 1) to 1970 (Gr. 3) Reading | Arithmetic |
|---|---|---|---|---|---|
| | 28 | 29 | 30 | 31 | 32 |
| Above 95 | 12.05 | 12.91 | 13.17 | -.423 | -.424 |
| 90 | 11.71 | 12.59 | 12.63 | -.440 | -.443 |
| 85 | 11.38 | 12.32 | 12.36 | -.452 | -.454 |
| 80 | 11.21 | 12.06 | 12.14 | -.459 | -.463 |
| 75 | 11.03 | 11.86 | 11.94 | -.464 | -.470 |
| 70 | 10.86 | 11.71 | 11.76 | -.470 | -.477 |
| 65 | 10.77 | 11.49 | 11.60 | -.475 | -.482 |
| 60 | 10.63 | 11.34 | 11.45 | -.480 | -.489 |
| 55 | 10.48 | 11.19 | 11.31 | -.485 | -.494 |
| 50 | 10.37 | 11.08 | 11.18 | -.489 | -.498 |
| 45 | 10.25 | 10.93 | 11.03 | -.494 | -.505 |
| 40 | 10.14 | 10.77 | 10.87 | -.498 | -.510 |
| 35 | 10.02 | 10.66 | 10.76 | -.504 | -.514 |
| 30 | 9.88 | 10.48 | 10.58 | -.509 | -.522 |
| 25 | 9.74 | 10.33 | 10.37 | -.515 | -.531 |
| 20 | 9.57 | 10.12 | 10.15 | -.523 | -.539 |
| 15 | 9.40 | 9.88 | 9.96 | -.532 | -.549 |
| 10 | 9.06 | 9.55 | 9.64 | -.544 | -.566 |
| 5 | 8.42 | 9.02 | 9.15 | -.566 | -.586 |
| Below | | | | | |
| State Mean | 10.36 | 11.06 | 11.16 | -.490 | -.501 |
| s.d. | 1.22 | 1.22 | 1.22 | .043 | .050 |

PERCENTILE DISTRIBUTION

[1] Enrollment in 6th grade (1969) divided by enrollment in 1st grade (1969).

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## PROFILE OF SCHOOL DISTRICT CHARACTERISTICS

**District:** Scottsville **Code:** 701301

| thmetic (cont.) | Achievement Gain Scores | | | | Surrounding Conditions | |
|---|---|---|---|---|---|---|
| IATIONS | 1968 (Gr. 1) to 1970 (Gr. 3) | | 1967 (Gr. 3) to 1970 (Gr. 6) | | ENROLLMENT | |
| 1970 | Reading | Arithmetic | Reading | Arithmetic | Grades 1–12 | Stability[1] |
| 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| 13.17 | -.423 | -.424 | .389 | .095 | 9657 | 1.278 |
| 12.63 | -.440 | -.443 | .347 | .052 | 6750 | 1.203 |
| 12.36 | -.452 | -.454 | .324 | .031 | 5343 | 1.144 |
| 12.14 | -.459 | -.463 | .308 | .013 | 4274 | 1.116 |
| 11.94 | -.464 | -.470 | .295 | .000 | 3633 | 1.079 |
| 11.76 | -.470 | -.477 | .282 | -.014 | 3101 | 1.052 |
| 11.60 | -.475 | -.482 | .273 | -.025 | 2770 | 1.031 |
| 11.45 | -.480 | -.489 | .260 | -.035 | 2392 | 1.000 |
| 11.31 | -.485 | -.494 | .251 | -.044 | 2069 | 0.978 |
| 11.18 | -.489 | -.498 | .242 | -.053 | 1786 | 0.964 |
| 11.03 | -.494 | -.505 | .235 | -.062 | 1553 | 0.943 |
| 10.87 | -.498 | -.510 | .226 | -.071 | 1399 | 0.926 |
| 10.76 | -.504 | -.514 | .215 | -.079 | 1258 | 0.906 |
| 10.58 | -.509 | -.522 | .208 | -.090 | 1134 | 0.887 |
| 10.37 | -.515 | -.531 | .199 | -.104 | 929 | 0.859 |
| 10.15 | -.523 | -.539 | .188 | -.116 | 771 | 0.834 |
| 9.96 | -.532 | -.549 | .170 | -.127 | 597 | 0.810 |
| 9.64 | -.544 | -.566 | .154 | -.144 | 456 | 0.784 |
| 9.15 | -.566 | -.586 | .127 | -.176 | 320 | 0.727 |
| 11.16 | -.490 | -.501 | .250 | -.048 | 2875 | 0.981 |
| 1.22 | .043 | .050 | .084 | .083 | 3003 | 0.185 |

ed by enrollment in 1st grade (1969).

## PROFILE OF SCHOOL DISTRICT CHARACTERISTICS

District: Scottsville Code: 701301

| Percentile Rank | Surrounding Conditions[1] (continued) | | | | 1968-69 Expenditure | | |
|---|---|---|---|---|---|---|---|
| | Property value per pupil | Square miles per pupil | Proportion of minority | | Instructional Supervision | | Teach- |
| | | | Pupils | Staff | Principals | Other | |
| | 37 | 38 | 39 | 40 | 41 | 42 | 43 |
| Above 95 | $67.09 | .251 | .170 | .046 | $71.44 | $23.71 | $943.0 |
| 90 | 51.96 | .157 | .096 | .022 | 62.45 | 18.74 | 831.1 |
| 85 | 43.96 | .127 | .059 | .017 | 58.12 | 16.24 | 768.4 |
| 80 | 36.23 | .100 | .037 | .014 | 54.58 | 12.50 | 731.7 |
| 75 | 32.63 | .087 | .026 | .011 | 51.87 | 9.74 | 704.7 |
| 70 | 28.56 | .071 | .019 | .008 | 49.26 | 7.46 | 682.4 |
| 65 | 26.08 | .058 | .014 | .006 | 46.15 | 5.07 | 664.4 |
| 60 | 24.04 | .050 | .010 | .003 | 43.52 | 2.83 | 645.2 |
| 55 | 22.56 | .044 | .009 | .000 | 40.72 | 0.93 | 634.3 |
| 50 | 21.03 | .033 | .006 | .000 | 38.49 | 0.00 | 627.6 |
| 45 | 20.05 | .025 | .004 | .000 | 36.11 | 0.00 | 616.9 |
| 40 | 18.84 | .018 | .000 | .000 | 33.47 | 0.00 | 604.9 |
| 35 | 17.65 | .012 | .000 | .000 | 30.84 | 0.00 | 595.4 |
| 30 | 15.98 | .008 | .000 | .000 | 27.32 | 0.00 | 586.6 |
| 25 | 14.84 | .005 | .000 | .000 | 23.16 | 0.00 | 575.5 |
| 20 | 14.15 | .003 | .000 | .000 | 18.48 | 0.00 | 565.3 |
| 15 | 13.07 | .002 | .000 | .000 | 6.58 | 0.00 | 553.9 |
| 10 | 11.75 | .001 | .000 | .000 | 0.00 | 0.00 | 541.3 |
| 5 | 10.03 | .001 | .000 | .000 | 0.00 | 0.00 | 523.1 |
| Below | | | | | | | |
| State Mean | 27.96 | .077 | .034 | .009 | 36.98 | 6.34 | 668.2 |
| s.d. | 22.31 | .198 | .085 | .022 | 21.90 | 11.23 | 173.3 |

PERCENTILE DISTRIBUTION

[1]Variables are defined in section II.

## PROFILE OF SCHOOL DISTRICT CHARACTERISTICS

District: Scottsville Code: 701301

| ' (continued) | | 1968–69 Expenditures' Per Pupil | | | | |
|---|---|---|---|---|---|---|
| Proportion of minority | | Instructional Supervision | | Teaching | Instruction (regular day) | Central administration |
| Pupils | Staff | Principals | Other | | | |
| 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| 70 | .046 | $71.44 | $23.71 | $943.07 | $1,067.11 | $71.95 |
| 96 | .022 | 62.45 | 18.74 | 831.18 | 969.72 | 61.77 |
| 59 | .017 | 58.12 | 16.24 | 768.49 | 906.40 | 54.56 |
| 37 | .014 | 54.58 | 12.50 | 731.73 | 839.28 | 50.05 |
| 26 | .011 | 51.87 | 9.74 | 704.71 | 805.12 | 46.94 |
| 19 | .008 | 49.26 | 7.46 | 682.48 | 773.14 | 44.93 |
| 14 | .006 | 46.15 | 5.07 | 664.43 | 758.69 | 42.07 |
| 10 | .003 | 43.52 | 2.83 | 645.24 | 743.68 | 39.14 |
| 09 | .000 | 40.72 | 0.93 | 634.31 | 728.83 | 37.49 |
| 06 | .000 | 38.49 | 0.00 | 627.61 | 716.86 | 36.06 |
| 04 | .000 | 36.11 | 0.00 | 616.95 | 703.68 | 34.17 |
| 00 | .000 | 33.47 | 0.00 | 604.93 | 689.74 | 32.93 |
| 00 | .000 | 30.84 | 0.00 | 595.47 | 681.42 | 31.70 |
| 00 | .000 | 27.32 | 0.00 | 586.61 | 671.65 | 29.83 |
| 00 | .000 | 23.16 | 0.00 | 575.50 | 659.85 | 28.09 |
| 00 | .000 | 18.48 | 0.00 | 565.36 | 647.53 | 26.39 |
| 00 | .000 | 6.58 | 0.00 | 553.93 | 639.69 | 24.02 |
| 00 | .000 | 0.00 | 0.00 | 541.37 | 625.46 | 21.69 |
| 00 | .000 | 0.00 | 0.00 | 523.18 | 608.59 | 17.62 |
| 34 | .009 | 36.98 | 6.34 | 668.26 | 762.95 | 39.91 |
| 85 | .022 | 21.90 | 11.23 | 173.78 | 187.77 | 19.07 |

n II.

than is performance in arithmetic. Similarly, performance in ar
within-school factors than is performance in reading. The actua
near the low end of the range of expected scores. This finding
Scottsville's arithmetic program from grades 3 through 6. Of co
might also reflect a conscious decision to deemphasize arithmeti
other objectives regarded in Scottsville as having greater prior

In Scottsville, the actual gain in achievement scores bet
average for the State--and within the expected range considering
district. The actual gain in scores between grades 3 and 6 was
the area of arithmetic, was very close to the lower limit of the

Columns 35 through 45 describe some other attributes of the
tricts in the study. For example, Scottsville's pupil enrollment
defined in this report are well above average. The value of its
slightly below the average of the districts in this study. Its e
above average and for central administration, its expenditures wer
should be clearly understood that rankings relative to expenditur
in terms of the quality of Scottsville's program. Such data a
district in making hypotheses about possible factors that could b
improving the district's performance.

n arithmetic. Similarly, performance in arithmetic is influenced more by
than is performance in reading. The actual sixth grade arithmetic scores are
he range of expected scores. This finding might warrant a closer look at
tic program from grades 3 through 6. Of course, these lower arithmetic rankings
conscious decision to deemphasize arithmetic performance in favor of achieving
rded in Scottsville as having greater priority.

, the actual gain in achievement scores between grades 1 and 3 is about
--and within the expected range considering the unique attributes of the
gain in scores between grades 3 and 6 was lower than the State average and, in
c, was very close to the lower limit of the expected range of scores.

gh 45 describe some other attributes of the district relative to the 628 dis-
For example, Scottsville's pupil enrollment and stability of enrollment as
t are well above average. The value of its property on a per-pupil basis is
erage of the districts in this study. Its expenditures for principals was
central administration, its expenditures were below average. However, it
erstood that rankings relative to expenditures may or may not be significant
uality of Scottsville's program. Such data are provided merely to aid the
potheses about possible factors that could be changed in the interest of
t's performance.

Using the PIE System

The PIE system provides local education agencies (LEA's) with data about th of certain of their programs. At the same time, the system provides the State E ment and local administrators with a relatively objective means of identifying h performing programs. At both the State and local levels, objective information of educational systems can be used in identifying educational needs, determining priate means of meeting the needs, and evaluating the results obtained.

As new data relating to the schools of New York State become available, add be found for the PIE system. The system is not restricted to any specific set o PEP tests, but can be applied to a wide variety of data related to school outcom include nontest data, such as dropout rate or college-going rate of students, and testing instruments such as criterion-referenced tests.

Data reported in the Profiles can be analyzed in several ways. For exam comparisions, e.g., 1966-1967-1968, are possible for the academic achievement va comparisons will sometimes reveal trends in the achievement characteristics of body. A trend either upward or downward could be attributed to the changing so complexion of the surrounding community and/or to changes in the effectiveness program.

cal education agencies (LEA's) with data about the effectiveness

At the same time, the system provides the State Education Depart-

ith a relatively objective means of identifying high- and low-

he State and local levels, objective information about the performance

sed in identifying educational needs, determining the most appro-

ls, and evaluating the results obtained.

e schools of New York State become available, additional uses can

he system is not restricted to any specific set of data, such as the

a wide variety of data related to school outcomes. These might

ropout rate or college-going rate of students, and results from newer

terion-referenced tests.

ofiles can be analyzed in several ways. For example, interyear

968, are possible for the academic achievement variables. Such

eal trends in the achievement characteristics of the student

r downward could be attributed to the changing socioeconomic

community and/or to changes in the effectiveness of the school

Intergrade comparisons show how well the district is abl
group of students from one level to another, e.g., from grade 1
somewhat similar type of analysis can be made by comparing the
between grades 1 and 3 with the gain occurring between grades 1

Intersubject comparisons show how well students are doin
As a general rule, reading scores may be regarded as more respo
arithmetic scores are relatively more responsive to school infl
may be indicative of underlying shifts in the characteristics o
trends in arithmetic are more likely to indicate shifts in scho

## Implications for Education

The PIE system is designed to reduce the element of chance
facilitate the task of calculating the cost-effectiveness of alt
and organizational arrangements. Its immediate value will be to
those program areas in need of more detailed evaluation and perh
will eventually allow the development of simulation models for p
before they are actually made.

risons show how well the district is able to move more-or-less the same
one level to another, e.g., from grade 1 in 1968 to grade 3 in 1970. A
f analysis can be made by comparing the gain ($\Delta$) in pupil scores occurring
with the gain occurring between grades 1 and 6.

parisons show how well students are doing in reading relative to arithmetic.
ing scores may be regarded as more responsive to home influences, while
elatively more responsive to school influences. Thus, trends in reading
derlying shifts in the characteristics of the parent population, while
e more likely to indicate shifts in school program characteristics.

on

esigned to reduce the element of chance in decision making. The system can
alculating the cost-effectiveness of alternative instructional programs
gements. Its immediate value will be to help local districts recognize
eed of more detailed evaluation and perhaps additional resources. The system
e development of simulation models for predicting the consequences of decisions
made.

## SECTION II

## SUPPLEMENTARY TECHNICAL INFORMATION

- Definition of Variables
- Matrix of Variables
- Prediction Equations
- Statistical Terms

Definition of Variables (See Profile, pp. 7-11)

Columns 1 - 30. These columns reflect the distribution deviations of all but a few school districts in New York Stat raw means of the individual pupil scores for the district. T the amount of variability in the pupil scores within a distr the variation in scores obtained, i.e., the greater the sprea

Columns 31 - 34. Gain scores in these columns are defi two means, e.g., the raw mean of the 1970 third grade arithme first grade readiness test.

Column 35. Grades 1 through 12 enrollment in 1968.

Column 36. Enrollment in sixth grade (1969) divided by

Column 37. Property value per pupil was obtained by ta district as reported by the district in 1968 and dividing the enrollment as reported for 1968.

Column 38. Square miles per pupil was computed by takir reported by the Bureau of School District Organization and div enrollment of the district for 1968.

Columns 39 and 40. The proportion of Negro and Spanish computed for both pupils and staff. The pupil proportion was enrollment of Negroes and Spanish surnamed Americans divided b

Profile, pp. 7-11)

columns reflect the distribution of achievement test means and standard
chool districts in New York State. The mean scores are based on the
upil scores for the district. The standard deviation scores reflect
the pupil scores within a district (the higher the number the greater
ned, i.e., the greater the spread from low to high scores).
scores in these columns are defined in terms of the difference between
of the 1970 third grade arithmetic test minus the raw mean of the 1968

rough 12 enrollment in 1968.
n sixth grade (1969) divided by enrollment in first grade (1969).
ue per pupil was obtained by taking the full tax valuation of a
strict in 1968 and dividing the figure by the district's grades 1 - 12
8.
per pupil was computed by taking the land area of the district as
ol District Organization and dividing this figure by the 1 - 12
1968.
proportion of Negro and Spanish surnamed Americans in a district was
staff. The pupil proportion was defined as the 1970 third grade
nish surnamed Americans divided by 1970 third grade enrollment.

The staff proportion was defined as the number of Negro and Spanish surnamed Am
fessional staff in 1970 divided by number of Negro, SSA, and "other" professiona

Column 41. Expenditures for principals included salaries, equipment, supp
plus other expenses for principals--all divided by 1968 enrollment in grades 1

Column 42. Expenditures for other supervisory staff included salaries, eq
materials, other expenses for supervisors and cooperative board services--all d
enrollment in grades 1 - 12.

Column 43. Teaching expenditures included salaries of teachers, substitute
professional personnel plus related equipment, supplies, materials, textbooks, o
services from school districts in other states, tuition, vocational board and coo
services--all divided by 1968 enrollment in grades 1 - 12.

Column 44. Instructional expenditures for regular day school included sal
supplies, and other expenses associated with supervision, teaching, cocurricular
interscholastic athletics, guidance, psychological services, attendance service
and social work services--all divided by 1968 enrollment in grades 1 - 12.

Column 45. Central administration expenditures included salaries, equipme
materials, and other expenses associated with the chief school administrator, cu
ment and supervision, business administration, research, personnel, and school-c
all divided by 1968 enrollment in grades 1 - 12.

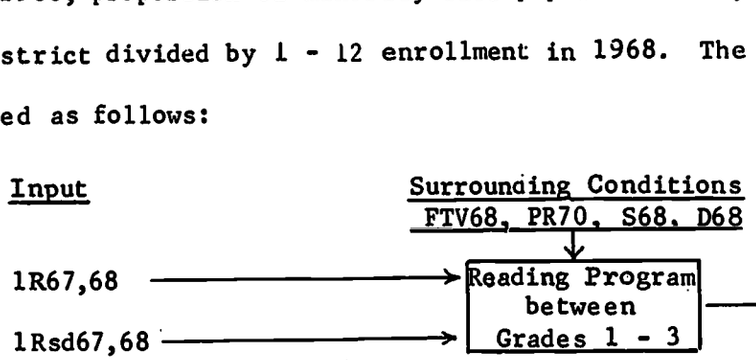
s the number of Negro and Spanish surnamed American (SSA) pro-
number of Negro, SSA, and "other" professional staff in 1970.
principals included salaries, equipment, supplies, and materials
--all divided by 1968 enrollment in grades 1 - 12.
other supervisory staff included salaries, equipment, supplies,
rvisors and cooperative board services--all divided by 1968

ures included salaries of teachers, substitutes, and noninstructional
equipment, supplies, materials, textbooks, other teaching expenses,
ther states, tuition, vocational board and cooperative board
lment in grades 1 - 12.

penditures for regular day school included salaries, equipment,
iated with supervision, teaching, cocurricular activities,
ce, psychological services, attendance services, health services,
ded by 1968 enrollment in grades 1 - 12.
ation expenditures included salaries, equipment, supplies,
iated with the chief school administrator, curriculum develop-
inistration, research, personnel, and school-community relations--
grades 1 - 12.

## Matrix of Variables

Equations were constructed to predict each of the 12 crit
given district. The matrix of variables (page 19) shows which p
in predicting which criterion variables. For example, to predic
grade reading scores in 1969, we used the following variables:
and 1967 average), first grade readiness standard deviation (196
valuation for 1968, proportion of minority race pupils in 1970,
area of the district divided by 1 - 12 enrollment in 1968. The
can be diagramed as follows:




Legend:
1R67,68 - Mean of 1967 and 1968 district means on first grade
1Rsd67,68 - Mean of 1967 and 1968 district standard deviations o
3R70 - Third grade reading mean for district in 1970.
FTV68 - Full tax valuation of district in 1968 divided by en
PE70 - Pupil Ethnicity - proportion of minority group pupil
S68 - "size" - enrollment in grades 1 - 12 divided by 1,00
D68 - "Density" - square miles in district divided by numb

to predict each of the 12 criterion or "output" values for a

riables (page 19) shows which predictor variables were involved

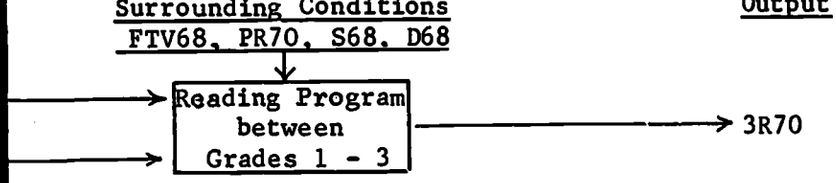
iables. For example, to predict the mean of a district's third

used the following variables: first grade readiness mean (1966

diness standard deviation (1966 and 1967 average), full tax

minority race pupils in 1970, 1 - 12 enrollment in 1968, and land

- 12 enrollment in 1968. The relationships among these variables




district means on first grade readiness tests.
district standard deviations on first grade readiness tests.
an for district in 1970.
district in 1968 divided by enrollment.
ortion of minority group pupils in third grade.
grades 1 - 12 divided by 1,000.
es in district divided by number of pupils.

MATRIX OF INDEPENDENT-DEPENDENT VARIABLE COMBINATIONS
USED IN FINAL PREDICTION EQUATIONS

| Independent (Predictor) Variables | Dependent (Criterion) Variables | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Third Grade | | | | Sixth Grade | | | | |
| | Reading | | Arithmetic | | Reading | | Arithmetic | | Gr |
| | 1969 | 1970 | 1969 | 1970 | 1969 | 1970 | 1969 | 1970 | Re |
| First Grade Readiness | | | | | | | | | |
| 1966-1967 Avg. Mean | x | | x | | x | | x | | |
| 1967-1968 Avg. Mean | | x | | x | | x | | x | x |
| 1966-1967 Avg. S.D. | x | | x | | | | | | |
| 1967-1968 Avg. S.D. | | x | | x | | | | | x |
| Third Grade Reading | | | | | | | | | |
| 1966 Mean (3R66) | | | | | x | | | | |
| 1966 S.D. (3Rsd66) | | | | | x | | x | | |
| 1967 Mean (3R67) | | | | | | x | | | |
| 1967 S.D. (3Rsd67) | | | | | | x | | x | |
| Third Grade Arithmetic | | | | | | | | | |
| 1966 Mean (3A66) | | | | | | | x | | |
| 1966 S.D. (3Asd66) | | | | | | | x | | |
| 1967 Mean (3A67) | | | | | | | | x | |
| 1967 S.D. (3Asd67) | | | | | | | | x | |
| Grade 1-3 Change (△) | | | | | | | | | |
| Reading Means(1966-68) | | | | | | | | | x |
| Reading S.D.(1966-68) | | | | | | | | | x |
| Arithmetic Means(1966-68) | | | | | | | | | |
| Environment | | | | | | | | | |
| Full Tax Valuation(FTV68) | x | x | x | x | x | x | x | x | x |
| Pupil Ethnicity (PE70) | x | x | x | x | x | x | x | x | x |
| Enroll. Size/1000 (S68) | x | x | x | x | | | | | x |
| Enroll. Growth (G68) | | | | | x | x | | | x |
| Enroll. Stability (ES70) | | | | | | | | | x |
| Enroll. Density (D68) | x | x | x | x | x | x | x | x | x |
| Density Squared ($D68^2$) | | | x | x | x | x | | | |
| D68 x FTV68 | | | x | x | | | | | |

PENDENT VARIABLE COMBINATIONS
PREDICTION EQUATIONS

| Dependent (Criterion) Variables | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Sixth Grade | | | | Achievement Gain (△) | | | |
| ic | Reading | | Arithmetic | | Gr. 1 to 3 | | Gr.3 to 6 | |
| 970 | 1969 | 1970 | 1969 | 1970 | Rdg. | Arith. | Rdg. | Arith. |
| | x | | x | | | | | |
| x | | x | | x | x | x | | |
| x | | | | | x | x | | |
| | x | | | | | | | |
| | x | | x | | | | | |
| | | x | | | | | x | |
| | | x | | x | | | x | |
| | | | x | | | | | |
| | | | x | | | | | |
| | | | | x | | | | x |
| | | | | x | | | | x |
| | | | | | x | x | x | |
| | | | | | x | x | | |
| | | | | | | | | x |
| x | x | x | x | x | x | x | x | x |
| x | x | x | x | x | x | x | x | x |
| x | | | | | x | x | x | x |
| | x | x | | | x | x | x | x |
| | | | | | x | x | x | x |
| x | x | x | x | x | x | x | x | x |
| x | x | x | | | | | | |
| x | | | | | | | | |

## Prediction Equations

The process of selecting the final set of predictor variables was a combination of art, science, and expediency. Several trials using nonlinear forms of predictor variables were run before the final equations were compared with each other on the basis of their logical consistency, and their simplicity.

Each predictor term in the equations on page 21 contains a variable and a regression coefficient or "b-weight." When a given district's actual values are multiplied by their corresponding coefficients, and the results are added, an expected score for the district is obtained. For example, using Scottsville's data, we can calculate a district mean score for third grade reading in 1970 as follows:

| Data for Scottsville | | | | regression coefficient | |
|---|---|---|---|---|---|
| S68 | = | 6.62 | x | .130 | = |
| FTV68 | = | 19.00 | x | .030 | = |
| PR70 | = | .011 | x | -5.221 | = |
| D68 | = | .009 | x | -1.614 | = |
| 1R67,68 | = | 68.85 | x | .298 | = |
| 1Rsd67,68 | = | 12.95 | x | -.112 | = |

Legend:
(See bottom page 18.)

Expected score
Actual score (3
Difference scor

selecting the final set of predictor variables to use in each equation involved
science, and expediency. Several trials using different combinations and
redictor variables were run before the final equations were adopted. The pre-
re compared with each other on the basis of their predictive effectiveness($R^2$),
tency, and their simplicity.

erm in the equations on page 21 contains a variable code preceded by a regres-
"b-weight." When a given district's actual values on these predictor variables
ir corresponding coefficients, and the resultant values added together, the
he district is obtained. For example, using Scottsville's data we can compute
for third grade reading in 1970 as follows:

| for Scottsville | | regression coefficient | | value of the term |
|---|---|---|---|---|
| = 6.62 | x | .130 | = | + .848 |
| = 19.00 | x | .030 | = | + .570 |
| = .011 | x | -5.221 | = | - .057 |
| = .009 | x | -1.614 | = | - .015 |
| 8 = 68.85 | x | .298 | = | + 20.517 |
| ,68= 12.95 | x | -.112 | = | - 1.450 |
| | | | | + 14.765 (constant te |

:
ottom page 18.)

Expected score (3R70) = 35.186
Actual score (3R70) = 34.850
Difference score = - .336

| | District's Expected Score | Prediction Equations* |
|---|---|---|
| Third Grade | 3R69 = | 16.658 +.160(S68) +.036(FTV68) -7.197(PR70) -.668(D68) +.278(1R66,67) -.131 |
| | 3R70 = | 14.765 +.130(S68) +.030(FTV68) -5.221(PR70) -1.614(D68) +.298(1R67,68) -.11 |
| | 3A69 = | 16.796 +.170(S68) +.049(FTV68) -11.420(PR70) -3.502(D68) +5.245($D68^2$) -.106 +.269(1R66,67) -.122(1Rsd66,67) |
| | 3A70 = | 14.942 +.160(S68) +.040(FTV68) -9.788(PR70) -8.481(D68) +8.734($D68^2$) -.123(D +.296(1R67,68) -.139(1Rsd67,68) |
| Sixth Grade | 6R69 = | 10.100 +.025(FTV68) +.697(3R66) +.308(3Rsd66) -7.825(PR70) -2.900(G) +.130( -.037($D68^2$) +.084(1R66,67) |
| | 6R70 = | 6.438 +.023(FTV68) +.693(3R67) +.417(3Rsd67) -8.014(PR70) -2.730(G) -1.412( -.429($D68^2$) +.117(1R67,68) |
| | 6A69 = | 4.491 +.024(FTV68) +.581(3A66) -.158(3Rsd66) +.446(3Asd66) -6.930(PR70) -.6 +.097(1R66,67) |
| | 6A70 = | .842 +.017(FTV68) +.612(3A67) +.152(3Rsd67) +.216(3Asd67) -7.353(PR70) + 1. +.107(1R67,68) |
| Change Scores | △R(1-3),68-70 = | -0.2184 +.0174(ES70) -.0263(D68) +.0013(S68) +.0003(W68) +.2245(△R -.0516(△Rsd1-3,66-68)-.0026(1R67,68)-.0022(1Rsd67,68)-.0453(PR70)+ |
| | △A(1-3),68-70 = | 0.3077 +.0400(ES70) -.0150(D68) +.0033(S68) +.0004(W68) +.2184(△R1 -.0566(△Rsd1-3,66-68)-.0020(1R67,68)-.0019(1Rsd67,68)-.0945(PR70) |
| | △R(3-6),67-70 = | 0.6700 -.0025(ES70) -.0646(D68) +.0007(S68) +.0009(W68) -.0033(△R1 -.0159(3R67) +.0104(3Rsd67) -.3064(PR70) -.0675(G) |
| | △A(3-6),67-70 = | .1837 +.0065(ES70) +.0219(D68) -.0010(S68) + .0007(W68) -.0248(△A1 -.0094(3A67) +.0080(3Asd67) -.2671(PR70) -.0317(G) |

*Symbols are defined on pages 16 through 19. -21-

| Prediction Equations* | $R^2$ |
|---|---|
| 7.197(PR70) -.668(D68) +.278(1R66,67) -.131(1Rsd66,67) | .347 |
| 5.221(PR70) -1.614(D68) +.298(1R67,68) -.112(1Rsd67,68) | .332 |
| 11.420(PR70) -3.502(D68) +3.245($D68^2$) -.106(D68)(FTV68) | .349 |
| .788(PR70) -8.481(D68) +8.734($D68^2$) -.123(D68)(FTV68) | .410 |
| +.308(3Rsd66) -7.825(PR70) -2.900(G) +.130(D68) | .617 |
| .417(3Rsd67) -8.014(PR70) -2.730(G) -1.412(D68) | .629 |
| .158(3Rsd66) +.446(3Asd66) -6.930(PR70) -.654(D68) | .405 |
| .152(3Rsd67) +.216(3Asd67) -7.353(PR70) + 1.217(D68) | .440 |
| 0263(D68) +.0013(S68) +.0003(W68) +.2245(ΔR1-3,66-68) 0026(1R67,68)-.0022(1Rsd67,68)-.0453(PR70)+.0022(G) | .237 |
| .150(D68) +.0033(S68) +.0004(W68) +.2184(ΔR1-3,66-68) 0020(1R67,68)-.0019(1Rsd67,68)-.0945(PR70) | .237 |
| 646(D68) +.0007(S68) +.0009(W68) -.0033(ΔR1-3,66-68) 67) -.3064(PR70) -.0675(G) | .448 |
| 9(D68) -.0010(S68) + .0007(W68) -.0248(ΔA1-3,66-68) 67) -.2671(PR70) -.0317(G) | .200 |

## Statistical Terms

The following definitions and discussion are provided to the data in this report.

Average (Mean). An average or mean score is obtained by and dividing the sum by the total number of scores.

Standard Deviation (S.D.)* In addition to establishing it is often useful to know the "spread" of the scores. Two g but the "spread" could still be quite different. For example, scores on the third grade reading test are very similar to on In this district, the "spread" of scores would be small. Anot children with high scores and a number of children with low s 50. In this district, however, the "spread" of scores would ting the "spread" of scores is to calculate a standard deviat

Usually about two-thirds of the scores will fall betwe one standard deviation below the mean. The larger the standa the "spread" or variability in the scores of a distribution. with the mixture of high and low scores would have a larger s district with student scores similar to each other.

*Quoted with adaptations from Local District Results, Michiga Department of Education. 1971. pp. 163-4.

ons and discussion are provided to assist the reader in interpreting

erage or mean score is obtained by adding all of the scores in the set
total number of scores.

D.)* In addition to establishing a mean for a distribution of scores,
the "spread" of the scores. Two groups of scores could have the same mean
l be quite different. For example, one district might have children whose
eading test are very similar to one another and have a mean score of 50.
d" of scores would be small. Another district might have a number of
nd a number of children with low scores and still have a mean score of
ver, the "spread" of scores would be large. One common way of indica-
is to calculate a standard deviation.
irds of the scores will fall between one standard deviation above and
w the mean. The larger the standard deviation, the larger will be
in the scores of a distribution. In the example above, the district
d low scores would have a larger standard deviation than would the
s similar to each other.

om Local District Results, Michigan Educational Assessment Program, Michigan
1971. pp. 163-4.

Regression Analysis.* Regression analysis allows the researcher to p
criterion (dependent) variable, e.g., third grade reading in 1970 (3R70),
other so-called predictor or independent variables (pupil readiness and co
The regression equation is derived from the interrelationships that are fo
dictor variables and the criterion variable.

Regression analysis begins with a set of two-variable correlations (r
variables and the criterion variable. The magnitude of r indicates the st
between any two variables. An r of .22 between full tax valuation (FTV) a
that as FTV increases, 3R70 tends to increase. The square of r ($.22^2$) in
percent of the variance in 3R70 is associated with the proportionate rate

Although each correlation by itself contributes information about the
ment to some single variable, a combination of relationships taken together
more predictive than any one r by itself. It is this combination of relati
the next step in regression analysis, the multiple correlation coefficient.

The coefficient of multiple correlation (R) indicates the strength of
one variable and two or more other variables taken together. R is a functi
tionships between the predictor variables and the achievement variables but
relationships among the predictor variables.

*Quoted with adaptations from Educational Quality Assessment, Phase II Data
Department of Education. 1971. pp. 1-4.

egression analysis allows the researcher to predict scores on one
e, e.g., third grade reading in 1970 (3R70), from the known scores on
independent variables (pupil readiness and conditions in the community).
rived from the interrelationships that are found to exist among the pre-
erion variable.

ns with a set of two-variable correlations (r) between the predictor
riable. The magnitude of r indicates the strength of the relationship
r of .22 between full tax valuation (FTV) and 3R70 would indicate
nds to increase. The square of r ($.22^2$) indicates that nearly 5
0 is associated with the proportionate rate at which FTV increases.
by itself contributes information about the relationship of achieve-
a combination of relationships taken together gives an index that is
by itself. It is this combination of relationships which leads to
alysis, the multiple correlation coefficient.

le correlation (R) indicates the strength of the relationship between
ther variables taken together. R is a function of not only the rela-
r variables and the achievement variables but also reflects the inter-
tor variables.

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